

CHAPTER 26

MAN-MADE VITREOUS FIBERS

1. Discussion

a. This chapter provides guidance for controlling and minimizing the exposure of Navy personnel to man-made vitreous fibers (MMVF) during use, removal and disposal of materials.

b. Man-made vitreous fibers, also referred to as man-made mineral fibers (MMVF), are a group of fibrous inorganic materials, generally aluminum or calcium silicates, that are derived from rock, clay, slag and glass. MMVF are widely used for thermal and acoustical insulation and as reinforcement insulation and lagging material.

c. There are three categories of MMVF:

(1) Glass fibers, including glass wool, filamentous glass and special application superfine glass.

(2) Mineral wools, more correctly separated into rock wool and slag wool.

(3) Refractory ceramic fibers (RCF).

d. Because these material are fibrous and bear some chemical and morphological similarities to asbestos minerals, the concern is that the MMVF may have similar health hazard potential. Through experimental data is contradictory, the consensus is that prolonged high exposure to MMVF may lead to increased health risks.

e. In contrast to asbestos fibers, MMVF are amorphous; that is they are glassy and lack a crystalline matrix. Consequently, the man-made fibers do not split longitudinally into thinner fibers, but break transversely into shorter fibers.

2. Applicability

a. The provisions in this chapter shall apply to all NAES shops, operations using man-made vitreous fiber products that are not embedded in a matrix material.

NOTE: Fibers or wools used as reinforcement in a binder/resin or other matrix are more appropriately considered composite fiber materials.

3. Permissible Exposure Limit and Action Level

a. Permissible Exposure Limit (PEL). The following PELs are based on an employee's time-weighted average airborne exposure for an 8-hour work shift during a 40-hour work week:

(1) Fibrous glass = 10 mg/m³ (ACGIH TLV for fibrous glass dust (1992-1993))

(2) Mineral wool = 10 mg/m³ (ACGIH TLV for mineral wool fiber (1992-1993))

(3) Refractory, ceramics = 15 mg/m³, respirable (OSHA PEL for particulates not otherwise regulated (1989))

(a) These PELs are based on ("**pure" product exposures**"). If the manufacturer's material safety data sheet (MSDS) lists other regulated chemicals (i.e. in the lubricating oils or sizings), then the applicable PELs for these chemicals must also be considered.

b. Action level (AL). The AL is defined as one half (1/2) the PEL calculated as an 8-hour, time weighted average.

c. All operations for removal of "high temperature" refractory ceramic fiber materials (i.e. air lancing of boilers, repacking of boiler walls, etc.) shall adhere to the PEL of 0.05 mg/m³, respirable crystalline silica dust. The reason for this variation is that, at high temperatures, RCF will convert to cristobalite, a form of crystalline silica.

4. Control of MMVF in the Workplace

a. The basic principles for controlling exposures in the occupational environment include substitution with less hazardous materials, engineering controls, administrative controls and use of personal protective equipment. Since substitute materials are not readily available, controlling airborne fiber and dust generation is accomplished through engineering controls and good housekeeping practices.

b. General Workplace Control Practices

(1) Use wet methods whenever possible.

(2) If needed to keep exposures below the AL, provide containments during removal procedures, including glove bags where applicable.

(3) Strict adherence to good housekeeping procedures is an effective way to minimize airborne dusts and fibers. At a minimum, work areas shall be vacuumed at the end of the work day using a high efficiency particulate air vacuum. Any MMVF scraps that fall to the ground or floor shall be packed up as soon as possible to reduce possible airborne fiber generation as a result of material disturbance.

(4) Personnel involved in MMVF operations shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the work area.

c. Ventilation

(1) Local exhaust ventilation (LEV) might be required to ensure that airborne levels of MMVF do not exceed the AL.

(2) Powered tools used for machining MMVF products (i.e., saws, drills and grinders) should be equipped with local exhaust to collect dust at the source.

d. Personal Protective Clothing and Related Facilities

(1) All personnel working with MMVF materials shall wear safety glasses or goggles with side shields and long sleeved clothing. Leather or other impenetrable gloves and disposable (i.e., Tyvek® or equivalent) coveralls should be worn. If non-disposable coveralls are used, they shall be thoroughly vacuumed before leaving the work area and shall be laundered (separately from other clothing) before wearing again.

(2) In addition to the personal protective equipment (PPE) listed above, personnel experiencing skin irritation shall ensure that their long sleeved clothing is closed at the neck and wrists. They should also wear a head covering.

(3) Respiratory protection may be warranted based on air sampling data, ceramic fiber removal operations.

(4) Personnel handling MMVF materials shall wash thoroughly with soap and water before breaks and at the end of the work shift. Showering at the end of the work shift is recommended.

5. Disposal Procedures MMVF waste shall be adequately wetted before placing in heavy duty plastic bags or other suitable impermeable containers for disposal in an approved sanitary landfill.

6. Training

a. Navy personnel who work with or handle MMVF or who may be exposed to MMVF in excess of the action level shall receive the following training prior to, or at the time of, initial assignment and annually thereafter:

(1) The health effects/hazards of MMVF

(2) Uses of MMVF products which could result in exposure

(3) Engineering controls and work practices

(4) Purpose, proper use and limitation of personal protective equipment and the required protective equipment when working with MMVF.

7. Industrial Hygiene Surveillance

a. Workplace monitoring will be performed during the affected shops annual Industrial Hygiene Survey, to characterize exposures for employees occupationally exposed to MMVF above the action level. Within a class or category of similar operation, sampling shall be of such frequency and pattern

as to accurately and reproducibly represent airborne levels produced by a typical operation within the call or category.

b. If the initial sampling or the periodic monitoring results statistically indicate that personnel exposures are below the action level, routine monitoring of personnel may be discontinued.

c. Whenever changes in production, engineering controls, work practices, or personnel occur, monitoring shall be conducted to ensure that exposures are below the action level.

d. Breathing zone air samples which are representative of the 8-hour time-weighted average of each employee shall be collected using the National Institute for Occupational Safety and Health (NIOSH) analytical method 0500 (total dust) and/or 0600 (respirable dust), as appropriate.

8. Man-made Vitreous Fiber Medical Surveillance Program As a minimum, medical surveillance shall be conducted per reference (nn).